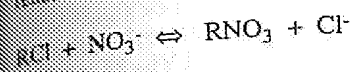


much higher relative to that of the chloride ion, decomplexation in phase 2 (strip phase) can occur when a very high chloride ion concentration has been established. The equilibrium reaction for this process is

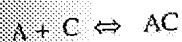


Very high concentration factors can be obtained with coupled facilitated transport processes of this kind.

VI.4.4.2 Aspects of separation [65]

As has been shown in figure VI - 36, the transport of oxygen through water can be enhanced by the addition of a specific carrier. Two mechanisms contribute to the total oxygen flux through the membrane, i.e. the oxygen molecules form a complex with the carrier and this carrier molecule diffuses through the membrane. The second part is the 'normal' Fickian diffusion of dissolved oxygen across the membrane.

Figure VI - 38 shows the concentration profiles when diffusion occurs via Fickian diffusion (molecular oxygen) and by diffusion of a carrier-oxygen complex (complexed oxygen). Both transport mechanisms occur simultaneously. Let us first consider the simple case, i.e. one-component transport. The permeant A can react with the carrier C to form a carrier-solute complex AC



This complex can then be transported across the membrane either in the uncomplexed or complexed form. The total flux of component A will then be the sum of the two contributions, i.e.

$$J_A = \frac{D_A}{\ell} (c_{A,o} - c_{A,\ell}) + \frac{D_{AC}}{\ell} (c_{AC,o} - c_{AC,\ell}) \quad (\text{VI} - 85)$$

The first term on the right-hand side of eq. VI - 85 represents permeant diffusion according to Fick's law, where D_A is the diffusion coefficient of (the uncomplexed) component inside the liquid film while $c_{A,o}$ is the concentration of component A just inside the liquid film. The second term represents carrier-mediated diffusion with the flux being proportional to the driving force, which in this case is the concentration difference of complex across the liquid film. D_{AC} is the diffusion coefficient of the complex and $c_{AC,o}$ is the concentration of the carrier-solute complex at the interface. The equilibrium constant of the complexation reaction is given by

$$K = \frac{c_{AC,o}}{c_{A,o} c_C} \quad (\text{VI} - 86)$$